NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER
(Acre)
CODE 391

DEFINITION

A riparian forest buffer is an area consisting of trees, shrubs, and herbaceous plants that function as vegetated ecosystems that are located adjacent to water bodies and water courses.

PURPOSES

The purposes of riparian forest buffers are:

Provides habitat and corridors for micro and macro aquatic and terrestrial flora and fauna;

Creates shade to moderate water temperatures and facilitate higher stream dissolved oxygen concentrations for aquatic organisms;

Filters excess sediment, nutrients, pesticides and other pollutants contained in surface runoff and shallow groundwater;

Provides a source of detritus and large woody debris for aquatic organisms;

Promotes streambank stabilization while at the same time facilitating the stream to perform geomorphologically;

Provides for effective flood storage.

CONDITIONS WHERE PRACTICE APPLIES

On stable areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands, and areas with groundwater recharge.

CRITERIA

General Criteria Applicable to All Purposes Previously Named

The location, layout, species selected, and density of the riparian forest buffer will accomplish the intended purpose and function.

Three Zone Buffer System:

Zone 1 is adjacent to the water body, water course, or to a groundwater recharge area and will contain the trees and shrubs needed to provide aquatic shade, insect habitat, bank stability and large woody debris. This zone should consist of undisturbed forest usually a 15-foot minimum width on each side of the water body or water course.

Zone 2 is landward and up-gradient of Zone 1 and it contains the trees and shrubs, as well as ground cover vegetation needed to filter sediments and pollutants from surface runoff. Together, these areas will provide a travel corridor and habitat for wildlife. This zone should consist of a managed forest, usually 20 to 60 feet in width on each side of the water body or water course.

Concentrated flow erosion, excessive sheet and rill erosion or mass soil movement shall be controlled in the up-gradient area immediately adjacent to Zone 2 prior to establishment of the riparian forest buffer.

Dominant vegetation will consist of existing or planted trees and shrubs suited to the site and the intended purpose. Occasional removal of some tree and shrub products, such as high value trees, is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance.

Concentrated flow erosion or mass soil movement shall be controlled in the up-gradient area immediately adjacent to Zone 2 prior to establishment of the riparian forest buffer.

Zone 3 is landward and up-gradient of Zone 2 and consists of a strip of herbaceous cover and functions as a filter or buffer protecting the riparian zone and maximizing sediment trapping. This zone is provided for runoff control, usually a 20-foot width on each side of the water body or water course. An alternate width consideration for this zone is a minimum width of 10 feet for slopes less than one percent and proportionally add 1-1/2 feet to the flow length for each degree of slope increase.

Additional Criteria to Enhance Water Quality and Habitat

Depending on the landscape features and function, the total width of the forest buffer on each side of the water body or water course should be within the following ranges:

Wildlife Habitat	30 to 300 feet
Flood Control	75 to 200 feet
Sediment Control	50 to 150 feet
Nutrient Removal	30 to 125 feet
Streambank Stabilization & Aquatic Food Web	25 to 50 feet
Water Temperature Moderation	20 to 75 feet

Site preparation and planting shall be done at a time and manner to insure survival and growth of selected species. Only viable, high-quality, and adapted planting stock should be used.

Site preparation shall be sufficient for establishment and growth of selected species and be done in a manner that does not compromise the intended purpose.

A seed source from the upstream or similar watersheds should be provided when using natural vegetation to establish riparian forest buffers.

Livestock numbers and/or densities shall be controlled or they shall be completely excluded from the buffer as necessary to achieve and maintain the intended purpose.

When protecting groundwater recharge areas, use zones appropriate to the installation and situation on the ground.

Drainage tile lines outletting to the water body will circumvent the intended function of the riparian forest buffer. Tile lines installed after the riparian forest buffer must outlet up-gradient from Zones 1 and 2, unless they are transporting clean water.

Erosion control grass cover shall be planted where needed.

For the desired kinds of wildlife, specify in a management plan, the type, amount, and distribution of vegetation required and the management condition of each necessary for

survival and reproduction of sustained population or communities.
The plant communities' established and target successful stage will depend on wildlife needs and existing resources in the watershed. Riparian widths and tree species will vary depending on the requirements of the fish and wildlife species and associated communities of concern.

The management plan should consider habitat and population objectives such as: habitat diversity, habitat linkages, daily and seasonal habitat ranges, limiting factors, and native plant communities.

The site should be established to native plant communities to optimize diversity and wildlife habitat.

Snag retention may be a critical component of the riparian forest buffer ecosystem. However, where snags direct stream flows into the banks and cause excessive streambank erosion and channel instability, an analysis weighing the benefits versus the liabilities should be conducted.

The native plant community should be maintained to optimize erosion and water quality functions of the riparian zone.

CONSIDERATIONS

Target riparian forest buffer restoration on a watershed basis to address forest fragmentation, connectivity, and provide corridors for wildlife by maintaining continuous streamside vegetation.

Establish alternative water sources or controlled access stream crossings to manage livestock access to the stream and riparian area.

The severity of bank erosion and its influence on existing or potential riparian trees and shrubs should be assessed.

When concentrated flow erosion, sheet and rill erosion, and sedimentation cannot be controlled vegetatively, consider structural or mechanical treatment.

Hardwood tree and shrub species that are native and have multiple values, such as those suited for timer, biomass, nuts, fruit, browse, nesting, aesthetics and tolerances to locally used herbicides, should be the preferred species to locate in riparian forest buffers. Hardwoods tend to take up more nutrients than conifers.

Avoid tree and shrub species which may be invasive or alternate hosts to undesirable pests. Species diversity should be considered to avoid loss of function due to species-specific pests. Do not plant monocultures.

Woody phreatophytes and hydrophytes that deplete groundwater should be used with caution in water-deficit areas.

The location, layout and density of the buffer should compliment natural features.

Corridor configuration, species planted and management should enhance habitats for threatened, endangered, and other species of concern, where applicable.

Where wildlife management is an objective, the food and cover value of the planting can be enhanced by using an approved habitat evaluation procedure to aid in selecting plant species and providing for other habitat requirements necessary to achieve the objective.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. Specifications shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The riparian forest buffer will be inspected periodically and protected to maintain the intended purpose from adverse impacts such as excessive vehicular and pedestrian traffic, timber removal, pest infestations, pesticide use on adjacent lands, livestock damage and fire.

As applicable, control of concentrated flow erosion, sheet and rill erosion or mass soil movement shall be continued in the up-gradient area immediately adjacent to Zone 2 to maintain buffer function.

Removals of tree shrub products shall be conducted in a manner that maintains the intended purpose, and meets the best management practice guidelines for the state.

Use of fertilizers, pesticides and other chemicals to assure buffer functions shall not compromise the intended purpose.

Harmful pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose. Weeds or herbaceous growth, which impairs the development of desired woody plant species should be controlled for two to three growing seasons after planting.

Grazing in riparian areas must be of a duration, timing and intensity to maintain plant community integrity. It should be noted, however, that grazing should be excluded in Zone 1, and in Zone 2 except if confers have been planted, then grazing can occur for a very short time to control grass around seedlings.

Cut and remove vegetation where the purpose for the buffer is nutrient uptake and water quality.

For wildlife benefits, mow at those times that optimize grass cover.

REFERENCES

1. Streambank and Shoreline Protection - Code 580

2. Stream Channel Stabilization - Code 584

3. Fence - Code 382

4. USDA, NRCS, Engineering Field Handbook, Chapter 16 - "Streambank and Shoreline Protection", as last revised

5. Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers", May, 1997

6. Forest Buffer Toolkit,

   http://www.dep.state.pa.us/dep/deputate/watermgt/WC/subjects/StreamReLeaf. htm

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.